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Common Corn Smut

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Common smut is a frequently observed disease of sweet, pop, and dent corn in South Dakota and throughout the world. Corn smut usually is not economically important, although in some years yield losses in sweet corn may be as high as 20%. In parts of Mexico, immature smut galls are a part of the cuisine known as huitlacoche, a local delicacy.

Symptoms

A corn plant may become infected by the corn smut fungus any time early in growth and development and becomes less susceptible after ear formation. Above-ground parts of the plant with active growth are most commonly infected, resulting in smut galls on the tassels (Fig. 1), ears (Fig. 2), along the midrib of the leaves (Fig. 3), near stem nodes (Fig 4), and aerial roots.

The smut gall is composed of a mass of black, greasy, or powdery spores enclosed by a smooth, greenish-white to silvery-white membrane. Galls on the ears may be up to 5 inches in diameter. Leaf infections result in small pustules, usually on the midrib, that cause some distortion of the leaf. As the spores mature, the outer covering of the gall becomes dry and papery and disintegrates, releasing the spores passively.

Yield losses are typically small, but the greatest yield loss will occur when the ear becomes infected or if smut galls form on the stalks immediately above the ears. If the galls are ruptured, clouds of dark brown spores are released. Very susceptible hybrids may suffer greater yield loss in very stressful years. Yield losses in field corn may appear to be significant when drought and stalk rots are also present. Because common smut is so visible, often blamed for the yield loss. Sweet corn may suffer greater loss due to diminished quality for canning

Figure 1. Corn tassel with mature common smut galls.

Figure 2. Young (top) and mature (bottom) common smut galls on corn ears.

Figure 3. Leaf galls with mature common smut galls.

Figure 4. Corn stalk with smut galls at node and on new growth.

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The Smut Fungus

Corn smut is caused by a plant pathogenic fungus, *Ustilago zeae,* that survives as a resistant spore over the winter or for several years, depending on environmental conditions. These survival spores are called teliospores and can be blown long distances with soil particles or carried into a new area on unshelled seed corn and in manure from animals that are fed infected corn stalks.

Teliospores of corn smut germinate in moist air and give rise to tiny spores called sporidia. The sporidia increase in number by budding like a yeast. These new spores germinate in dew or rainwater that collects in the leaf sheaths, ear tips, and crevasses on the plant, leading to infections that are visible in about 10 days.

Wounds from various injuries such as hail and insect feeding provide points for the corn smut fungus to enter the plant. Plants stressed due to low soil fertility are also more prone to infection. Excessive nitrogen fertility can also increase the risk of smut infection.

Development of smut depends on temperature and moisture. In a warm season, the amount of smut produced is related closely to soil moisture, especially during June. Smut is more common during years with high summer temperatures. When temperatures are lower than normal, there may be little smut even though soil moisture remains high.

In years when smut is common or plentiful, livestock producers are often concerned that the smut may be harmful to livestock fed grain that may be covered in smut spores. Smuts do not produce harmful mycotoxins and there is no information in scientific literature suggesting hazards from feeding smutty corn grain. The livestock can find the spores irritating to their nasal passages and sinuses and may prefer not to eat smutty corn if other alternatives are available, but there are no direct hazards from feeding the grain.

Management

Field Corn

- **Removing smut galls is not practical in commercial production.**

- **In order to reduce infection sites associated with insect injury, control corn borers as first tassels appear by application of insecticides when insect populations are high or plant insect resistant hybrids.**

- **Maintain appropriate soil fertility levels.**

- **Avoid injury of roots, stalks, and leaves during cultivation.**

- **Deep plow diseased corn stalks in the fall to bury surviving spores.**

- **Use smut resistant hybrids or varieties.** Dent corn is generally more resistant to corn smut than sweet or popcorn.

Home Gardens

- **Remove smut galls before they break open, and bury or burn them.** This practice must be done on a community basis in order to be effective.

- **To reduce infection sites from insect injury, control corn borers as first tassels appear by application of insecticides when insect populations are high.**

- **Maintain appropriate soil fertility levels.**

- **Avoid injury of roots, stalks, and leaves during cultivation.**

- **Remove diseased corn stalks in the fall and till soil bury surviving spores.**

- **Use resistant hybrids or varieties.** In sweet corn, larger, later-maturing varieties are usually more resistant than smaller, early varieties.

  Highly susceptible sweet corn varieties include: Spring Gold, Duet, Golden Bantam, Golden Beauty, Silver Queen, and Country Gentlemen Hybrid.

  Resistant sweet corn varieties include: Ambrosia, Apache Gold Cup, Aztec, Bellringer, Calumet, Capitan, Cherokee, Comanche Hybrid, Comet Hybrid, Golden Gleam, Golden Security, Serendipity, Merit, Stylepak Hybrid, Sweet Sue, Tendersweet Hybrid, Wintergreen.

  'Merit' has been reported as resistant but in recent screening at SDSU, was proven susceptible.

  Resistant varieties are not immune to smut.

Image credits: Figs. 1, & 2b: SDSU file photos,
Figs. 2a, 3, & 4: M. A. Draper

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